



ICAO ENGINE nvPM EMISSIONS DATA SHEET

SUBSONIC ENGINES

ENGINE IDENTIFICATION: Trent XWB-84 BYPASS RATIO (-): 9.0
 UNIQUE ID NUMBER: 01P18RR124 PRESSURE RATIO π_{co} (-): 41.1
 COMBUSTOR: Phase5 Tiled
 ENGINE TYPE: TF RATED OUTPUT F_{oo} (kN): 379.0

REGULATORY DATA

CHARACTERISTIC VALUES:	LTO_{mass}/F_{oo} (mg/kN)	LTO_{num}/F_{oo} (particles/kN)	NVPM MASS CONCENTRATION ($\mu\text{g}/\text{m}^3$)
LTO/ F_{oo} AND MAX nvPM _{mass}	156.1	1.93E+15	2619
AS % OF CAEP/10 LIMIT	-	-	70.5
AS % OF CAEP/11 LIMIT (InP)	44.9	46.3	
AS % OF CAEP/11 LIMIT (NT)	72.9	69.4	

MEASURED DATA

MODE	POWER SETTING (% F_{oo})	TIME minutes	FUEL FLOW kg/s	EMISSIONS INDICES*		NVPM MASS CONCENTRATION PEAK nvPM _{mass} ($\mu\text{g}/\text{m}^3$)
				EI _{mass} (mg/kg)	EI _{num} (particles/kg)	
TAKE-OFF	100	0.7	2.819	40.9	1.63E+14	
CLIMB OUT	85	2.2	2.306	60.1	2.83E+14	
APPROACH	30	4.0	0.801	93.2	9.92E+14	
IDLE	7	26.0	0.291	25.1	7.75E+14	
LTO TOTAL (kg, mg, number of particles)			1068	52399	6.48E+17	-
NUMBER OF ENGINES				3	3	3
NUMBER OF TESTS				4	4	4
AVERAGE LTO/ F_{oo} VALUES (mg/kN, particles/kN)				138.2	1.71E+15	-
MAX EI VALUES (mg/kg, particles/kg) AND MAX MASS CONC. ($\mu\text{g}/\text{m}^3$)				132.6	1.03E+15	2381

* Emissions Indices are corrected for thermophoretic loss and fuel hydrogen content

DATA FOR EMISSIONS INVENTORIES (ESTIMATIONS FOR ENGINE EXIT PLANE VALUES)

MODE	POWER SETTING (% F_{oo})	CORRECTED EMISSIONS INDICES	
		EI _{mass_SL} (mg/kg)	EI _{num_SL} (particles/kg)
TAKE-OFF	100	44.2	2.34E+14
CLIMB OUT	85	65.5	4.42E+14
APPROACH	30	106.6	2.15E+15
IDLE	7	31.0	1.85E+15

AMBIENT CONDITIONS

	From	To	FUEL	
BAROMETER (kPa)	98.6	101.9	HEAT OF COMBUSTION (MJ/kg)	43.18
TEMPERATURE (K)	283.0	295.0	HYDROGEN CONTENT (%mass)	13.84
HUMIDITY (kg water/kg dry air)	0.0006	0.0096	AROMATICS CONTENT (%vol)	16.8
			NAPHTHALENE CONTENT (%vol)	1.23
			SULPHUR CONTENT (ppm by mass)	373

MANUFACTURER: Rolls-Royce plc
 TEST ORGANIZATION: Rolls-Royce plc
 TEST LOCATION: Derby
 TEST DATES: 03/07/2014-08/12/2018

REMARKS

1. Certification report EDNS01000844195
2. The maximum EI_{mass} occurs between 30% and 85% F_{oo}
3. The maximum EI_{num} occurs between 30% and 85% F_{oo}
4. Corrected peak EI number value (fuel correction) since EEDB v30